Claims

1. System (1) for dispensing stackable objects (2) in shaft-type dispenser magazines (13) of at least one storage unit (4) and monitoring the levels (31) in the dispenser magazines (13) by means of a detection system (30), which dispenser magazines (13) are disposed in the longitudinal direction of the storage unit (4) aligned one after the other in a row and each is formed by a guide section against certain regions of which the objects (2) stacked one on top of the other in a dispenser magazine (13) lie, and discharge mechanisms (21) controlled by a computer system are provided at the bottom end (20) of each of the dispenser magazines (13), and the detection system (30) is connected to the computer system, wherein the detection system (30) comprises at least one control carriage (32) disposed above the top end (38) of the dispenser magazines (13) which can be displaced by means of at least one drive system (37; 37') between the individual dispenser magazines (13) in the longitudinal direction of the storage unit (4) and which is provided with a measuring unit (33) for detecting the distance (41) between the uppermost object (2) lying the farthest away from the discharge mechanism (21) and a maximum, top level limit (42) of a dispenser magazine (13) in order to determine the level (31) of objects (2) in at least one of the dispenser magazines (13).

2. System according to claim 1, wherein the control carriage (32) has at least one guide arrangement (35) by means of which it is guided on a guide track (36) extending in the longitudinal direction of the storage unit (4) and disposed adjacent to the top end (38) of the dispenser magazines (13).

3. System according to claim 2, wherein the guide track (36) is provided in the form of at least one linear guide (36') and the control carriage (32) is mounted by means of the guide arrangement (35) on the linear guide (36'), and is mounted on a support frame (8) of the system (1) so that it can be displaced by means of the drive system (37; 37').

4. System according to claim 1, wherein the drive system (37; 37') is provided in the form of a traction drive, friction gear drive, toothed gear-toothed rack drive or linear drive coupled with a drive motor (56; 60) and the drive motor (56; 60) is connected to a control

system of the computer system.

5. System according to claim 1, wherein the measuring unit (33) is provided in the form of a measuring system which detects the distance (41) without contact.

6. System according to claim 5, wherein the measuring unit (33) is provided in the form of an optoelectronic measuring system, in particular a laser or infrared measuring system, and a scanning beam (39) of the measuring unit (33) extends essentially parallel with the longitudinal extension of the dispenser magazines (13) and essentially perpendicular to the discharge plane (24) of the discharge mechanism (21).

7. System according to claim 5, wherein the measuring unit (33) is provided in the form of an ultrasound sensor and ultrasound waves of the measuring unit (33) extend essentially parallel with the longitudinal extension of the dispenser magazines (13) and essentially perpendicular to the discharge plane (24) of the discharge mechanism (21).

8. System according to claim 1, wherein a positioning system (58) is provided for positioning and detecting the actual position of the control carriage (32) relative to the individual dispenser magazines (13).

9. System according to claim 8, wherein the positioning system (58) comprises a distance measuring system or a position locating system for detecting the relative position of the control carriage (32) with respect to the individual dispenser magazines (13).

10. System according to claims 4 and 9, wherein the drive motor (56; 60) incorporates the distance measuring system or the distance measuring system is disposed between the control carriage (32) and a support frame (8) of the system (1).

11. System according to claim 9, wherein the position locating system is provided in the form of a navigation system, in particular GPS, comprising a transmitter and/or receiver unit disposed on the control carriage (32) and a transmitter and/ or receiver unit disposed in the frame region of the system (1).

12. System according to claim 1, wherein a second storage unit (4') is disposed lying opposite the first storage unit (4) by reference to a vertical plane of symmetry (12), and the second storage unit (4') has shaft-type, elongate dispenser magazines (13) disposed in its longitudinal direction aligned one after the other in a row, and a discharge mechanism (21) is provided at the bottom end (20) of each dispenser magazine (13) , and a conveyor system (3), in particular a belt conveyor, extends between the two storage units (4, 4') parallel with their longitudinal direction disposed at a slight distance underneath the bottom end (20) of the dispenser magazines (13) and a discharge direction of each discharge mechanism (21) extends transversely to the longitudinal direction of the conveyor system (3).

13. System according to claim 12, wherein the storage units (4, 4') are disposed on both sides of the guide track (36), and the guide track (36) extends continuously, adjacent to and parallel with the top end (38) of the oppositely lying dispenser magazines (13) in the longitudinal direction of the storage units (4, 4') across the entire length of the system (1), and the control carriage (32) is provided with two respective measuring units (33) transversely offset from the guide track (36) in the direction of the storage units (4, 4') and disposed above the dispenser magazines (13) of the storage units (4, 4') for detecting the distance (41) in the relevant dispenser magazines (13) of the storage units (4, 4').

14. System according to claim 1 or 12, wherein the dispenser magazines (13) of the storage units (4, 4') are inclined towards a horizontal conveyor plane of the conveyor system (3) and optionally also in the longitudinal direction of the conveyor system (3).

15. System according to claims 1, 12 or 13, wherein the dispenser magazines (13) and the guide track (36) are mounted on a common support frame (8) of the system (1) and the guide section of the dispenser magazines (13) is of a U-shaped design and is open at its terminal ends (20, 38), and a base (15) faces the support frame (8) and parallel legs (16) of the base (15) bound a slot-like object top-up opening (19).

16. System according to claim 1, 5 to 7, wherein the at least one measuring unit (33) is connected to a control system of the computer system of a warehouse management system and/or a control unit (63).

17. System according to one of claims 1 to 16, wherein each dispenser magazine (13) is provided with a control unit (63) comprising at least one input device (64) and/or output device (65) with an acoustic and/or optical output element, for example a signal horn and/or warning lamp and/or speech output module.

18. System according to claim 1, wherein the at least one measuring unit (33) and the control system of the computer system of the warehouse management system and/or the control unit (63) and/or the drive system (37, 37'), in particular the controller of the drive motor (56; 60), are respectively provided with a transmitter and receiver unit for reciprocally transmitting data and/or signals wirelessly.

19. Method of dispensing stackable objects (2) in shaft-type dispenser magazines (13) of at least one storage unit (4) and monitoring the level (31) in the dispenser magazines (13) by means of a detection system (30), whereby the objects (2) are firstly stacked one on top of the other in shaft-type dispenser magazines (13) disposed one after the other in a row, after which they are dispensed individually by means of computer-controlled discharge mechanisms (21) disposed at the bottom end (20) of each of the dispenser magazines (13), wherein a control carriage (32) incorporating the detection system (30) is displaced in the longitudinal direction of the storage unit (4) above top ends (38) of the dispenser magazines (13) between the dispenser magazines (13) disposed one after the other in the displacement (46) of the control carriage (32), and as the control carriage (31) is being displaced, a distance (41) between the uppermost object (2) lying farthest away from the discharge mechanism (21) and a maximum, top level limit (42) of a dispenser magazine (13) is detected in at least one of the dispenser magazines (13) by means of at least one measuring unit (33) disposed on it and incorporating the detection system (30), after which the level (31) in this relevant dispenser magazine (13) is determined by the computer system.

20. Method of dispensing stackable objects (2) in shaft-type dispenser magazines (13) of at least one storage unit (4) and monitoring the level (31) in the dispenser magazines (13) by means of a detection system (30), whereby objects (2) of a same type are firstly stacked one on top of the other in shaft-type dispenser magazines (13) disposed one after the other in a row, after which they are dispensed individually by means of discharge

mechanisms (21) controlled by the computer system disposed at the bottom end (20) of each of the dispenser magazines (13), wherein firstly, at least one type of object (2) forming part of an order is electronically detected by the computer system in a known manner, after which a desired stock level of objects (2) needed in the relevant dispenser magazine (13) and corresponding to the order is calculated by the computer system, and then a distance (41) between the uppermost object (2) lying farthest away from the discharge mechanism (21) and a maximum, top level limit (42) of a dispenser magazine (13) is measured without contact in at least the one dispenser magazine (13) containing the objects (2) for this order, the current level (31) in this relevant dispenser magazine (13) is determined and, taking account of the dimensions (45) of the objects (2) stacked one on top of the other in the stacking direction, the actual stock level of objects (2) in this relevant dispenser magazine (13) is calculated by the computer system, after which the actual stock level of objects (2) is compared with the desired stock level for this relevant dispenser magazine (13) and a demand message is issued to an operator to top up the relevant dispenser magazines (13) at the computer system and/ or at a control unit (63) if the actual stock level of objects (2) falls short of the desired stock level of objects (2) needed for the order entered and/or will shortly fall short of it.

21. Method of dispensing stackable objects (2) in shaft-type dispenser magazines (13) of at least one storage unit (4) and monitoring the level (31) in the dispenser magazine (13) by means of a detection system (30), whereby objects (2) of a same type are firstly stacked one on top of the other in shaft-type dispenser magazines (13) disposed one after the other in a row, after which they are dispensed individually by means of discharge mechanisms (21) controlled by the computer system disposed at the bottom end (20) of each of the dispenser magazines (13), wherein firstly, a sales quantity predicted by the computer system for at least one type of object (2) within a set time window is electronically detected, after which a desired stock level of objects (2) needed in the relevant dispenser magazine (13) corresponding to the predicted sales quantity is calculated by the computer system, and then a distance (41) between the uppermost object (2) lying farthest away from the discharge mechanism (21) and a maximum, top level limit (42) of a dispenser magazine (13) is measured in this relevant dispenser magazine (13) without contact, the current level (31) in this relevant dispenser magazine (13) is determined and, taking account of the dimensions

(45) of the objects (2) stacked one on top of the other in the stacking direction, the actual stock level of objects (2) in this relevant dispenser magazine (13) is calculated by the computer system, after which the actual stock level of objects (2) is compared with the desired stock level for this relevant dispenser magazine (13) and a demand message is issued to an operator to top up the relevant dispenser magazine (13) at the computer system and/or at a control unit (63) if the actual stock level of objects (2) falls short of the desired stock level of objects (2) needed for the predicted sales quantity and/or will shortly fall below it.

22. Method according to claim 21, wherein a predicted sales quantity of several different objects (2) within a set time window is firstly electronically detected by the computer system, after which a desired stock level of objects (2) needed in the relevant dispenser magazines (13) corresponding to the predicted sales quantity is calculated by the computer system, and then a respective distance (41) between the uppermost object (2) lying farthest away from the discharge mechanism (21) and a maximum, top level limit (42) of a dispenser magazine (13) is determined in these relevant dispenser magazines (13) without contact, the respective current level (31) in the relevant dispenser magazines (13) is determined and, taking account of the dimensions (45) of the objects stacked one on top of the other in the stacking direction, the actual stock level of objects (2) in these relevant dispenser magazines (13) is calculated by the computer system, after which the respective actual stock level of objects (2) is compared with the desired stock level for these relevant dispenser magazines (13) and a demand message is issued to an operator to top up the relevant dispenser magazine (13) at the computer system and/or at a control unit (63) if the actual stock level of objects (2) falls short of the different objects (2) needed for the predicted sales quantity and/or will shortly fall short of it.

23. Method according to claim 20, wherein at least one order made up of several different objects (2) is firstly electronically detected by the computer system in a known manner, after which a desired stock level of objects (2) needed in the relevant dispenser magazines (13) corresponding to the order is calculated by the computer system, and then a distance (41) between the uppermost object (2) lying farthest away from the discharge mechanism (21) and a maximum, top level limit (42) of the dispenser magazines (13) is respectively measured without contact in at least the dispenser magazines (13) containing the objects

(2) for the order, the current level (31) in these relevant dispenser magazines (13) is determined and, taking account of the dimensions (45) of the objects (2) stacked one on top of the other in the stacking direction, the actual stock level of objects (2) in these relevant dispenser magazines (13) is calculated by the computer system, after which the actual stock level of objects (2) is compared respectively with the desired stock level for these relevant dispenser magazines (13) and a demand message is issued to an operator to top up the relevant dispenser magazine (13) at the computer system and/or at a control unit (63) if the actual stock level of objects (2) in one of the dispenser magazines (13) falls short of the desired stock level of objects (2) needed for the order entered and/or will shortly fall short of it.

24. Method according to claim 20, wherein once the first order and at least one other order has been electronically detected by the computer system, a desired stock level of objects (2) needed in the relevant dispenser magazines (13) corresponding to the orders is calculated by the computer system, and then a distance (41) between the uppermost object (2) lying farthest away from the discharge mechanism (21) and a maximum, top level limit (42) of the dispenser magazines (13) is measured without contact respectively in at least the dispenser magazines (13) containing the objects (2) for the orders, the respective current level (31) in these relevant dispenser magazines (13) is determined and, taking account of the dimensions (45) of the objects (2) stacked one on top of the other in the stacking direction, the actual stock level of objects (2) in these relevant dispenser magazines (13) is calculated by the computer system, after which the actual stock level of objects (2) is compared with the desired stock level for these relevant dispenser magazines (13) and a demand message is issued to an operator to top up the relevant dispenser magazine (13) at the computer system and/or at a control unit (63) if the actual stock level of objects (2) in one of the dispenser magazines (13) falls short of the desired stock level of objects (2) needed for the orders entered and/or will shortly fall below it.

25. Method according to claims 20 to 24, wherein the demand message is output optically and/or acoustically and/or as a speech message.

26. Method according to one of claims 20 to 24, wherein the distance (41) for determining the levels (31) in the relevant dispenser magazine(s) (13) is detected by means of

measuring units incorporating the detection system (30) disposed on each dispenser magazine (13), in particular optoelectronic measuring systems or ultrasound sensors.

27. Method according to one of claims 20 to 24, wherein a control carriage (32) incorporating the detection system (30) is displaced in the longitudinal direction of the storage unit (4) above top ends (38) of the dispenser magazines (13) between the dispenser magazines (13) disposed one after the other in the displacement direction (46) of the control carriage (32), and the distance (41) for determining the levels (31) is measured in the relevant dispenser magazine(s) (13) during the displacement of the control carriage (32) by means of at least one measuring unit (33) disposed on it and incorporating the detection system (30).

28. Method according to claim 27, wherein the control carriage (32) is moved and positioned on a guide track (36) extending in the longitudinal direction of the storage unit (4) and disposed adjacent to the top end (38) of the dispenser magazines (13) between the dispenser magazines (13) disposed one after the other in the displacement direction (46) of the control carriage (32).

29. Method according to one of claims 19 to 28, wherein the distance (41) is measured only in that or those dispenser magazines (13) used to store and dispense the objects (2) sorted into consignments for the order or orders or for the predicted sales quantity, and the detected distance value of the relevant dispenser magazine or magazines (13) is transmitted to the computer system or a control unit (63).

30. Method according to one of claims 19 to 28, wherein the control carriage (32) approaches and is positioned at only that or those dispenser magazines (13) in which the objects (2) for the order or orders or the predicted sales quantity are stored and dispensed, and the detected distance value of the relevant dispenser magazine or magazines (13) is transmitted to the computer system or a control unit (63).

31. Method according to one of claims 19 to 28, wherein the control carriage (32) is moved continuously backwards and forwards in a pendulum motion between the first and

last dispenser magazine (13) in its displacement direction (46) and the distance (41) for determining the level (31) is detected in each dispenser magazine (13) during its displacement from the first dispenser magazine (13) to the last dispenser magazine (13) and/or from the last dispenser magazine (13) to the first dispenser magazine (13), and the detected distance value of each dispenser magazine (13) is transmitted to the computer system or to a control unit (63).

32. Method according to one of claims 19 to 28, wherein the control carriage (32) is moved backwards and forwards in a pendulum motion between the first and last dispenser magazine (13) in its displacement direction (46) at controlled time intervals and the distance (41) for determining the level (31) is detected in each dispenser magazine (13) during its displacement from the first dispenser magazine (13) to the last dispenser magazine (13) and/or from the last dispenser magazine (13) to the first dispenser magazine (13), and the detected distance value of each dispenser magazine (13) is transmitted to the computer system or to a control unit (63).

33. Method according to one of claims 19 to 32, wherein the objects (2) dispensed from the dispenser magazines (13) are transferred by means of the discharge mechanisms (21) out of the dispenser magazines (13) based on the orders and deposited on a conveyor system (3) disposed along the storage unit (4) or are conveyed grouped in individual orders in transport containers.